THE

Malayan Agricultural Journal.

AUGUST, 1934.

EDITORIAL.

Bunch-Rot of Oil Palms.

The intensive cultivation of oil palms, such as obtains under plantation conditions, brings to light diseases and other affections which pass unnoticed—if indeed they occur at all—under conditions of natural growth, as in West Africa. This is not peculiar to the oil palm—it is common wherever large populations of a plant are grown.

In some cases, such diseases are endemic, while in other cases they are epidemic, the spread of the disease being due to the large number of trees of one kind in close proximity and to the advent of favourable conditions for such spread. Again, disease may become evident by reason of the lowering of the vitality of the plant through heavy fruiting.

It would seem that this latter is a contributory cause of fruit-bunch rot of oil palms. Mr. R. A. Altson, in an article on this subject included in the present number, finds that the disease affects the fruit-bunches of certain high-yielding strains of the oil palm. Evidence is brought forward to shew that the rot is caused by the saprophytic invasion of tissues whose resistance has been lowered by a nutritional disturbance. It is suggested that the nutritional disturbance is brought about by a soil deficiency; it is considered that this deficiency may be aggravated or induced by artificial pollination. The work, however, has not progressed sufficiently far to enable definite recommendations to be made regarding a manurial programme to make good such deficiencies.

The writer is able to recommend that artificial pollination should not be practised on high-yielding strains at least until they are found to be capable of bringing to maturity their full crops of naturally-pollinated bunches. Where the disease is found to be present it is doubtful whether anything is to be gained by removal and destruction of infected bunches; they should not, however, be sent to the factory as they will adversely affect the acidity of the palm oil.

Insect Pests of Stored Derris.

It is somewhat disconcerting to find that a plant such as derris (tuba root), which is grown and used entirely for its insecticidal properties, should itself be subject to the attacks of insects, both in the growing crop and as a stored product.

The increasing importance of derris and the wide recognition it is now receiving as an insecticide renders it desirable that precautions should be taken to ensure that it be marketed in as perfect condition as possible. Mr. N. C. E. Miller, in an article on "Control of Insect Pests of Stored Derris", which will be found on another page of this number, gives full instructions for the control of such pests. If his precautionary measures are adopted, the exporter may be assured that the consumer will receive the root in good condition.

A Special Bulletin of this Department is now in the Press, which gives a full account of the insects which attack stored derris and methods of control. Owing to the importance of this subject, it is considered that the present account, drawn from the Bulletin, will be welcomed by those engaged in the cultivation and export of derris root.

Disease of the Durian Tree.

Though the durian fruit may not find universal favour, the tree is the most valuable in the small holding. The fortunate possessor of a few durian trees derives considerable financial benefit from the sale of the fruit. The loss of but one tree in a holding therefore, may be a serious matter to the owner. They are very large trees and slow growing, so that any loss is not readily replaced.

Mr. A. Thompson's article on a "Disease of the Durian Tree" describes the recent investigation of a newly recorded disease capable of causing the death of durian trees. Increasing attention and care is taken by small-holders to ensure the health of their crops. Consequently, this contribution to our knowledge of a disease of the durian tree, with methods for its control, will be received by them with more attention than would have been the case a few years ago.

Original Articles.

FRUIT-ROT OR BUNCH-ROT OF THE OIL PALM

BY
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Introduction.

In August, 1933, an investigation was begun into the nature of a rot of fruit-bunches which was causing considerable losses in a large area of oil palms, not less than 40 per cent. of the crop from about 700 acres being affected. The palms were seven years old and had been raised from selected seed obtained from an estate in Sumatra. That this estate had successfully isolated a high-yielding strain was evident. The number of female inflorescences produced by the affected palms on the Malayan estate in the previous year had been, on an average per palm, more than double that produced in this country by the normal type of Deli palm at the same age and during the same period.

In February of this year a second outbreak of fruit-rot was reported from an estate eighty miles distant from the former area. The palms were seven to eight years old and had been grown from Sumatran seed. The precise origin of this seed was unknown, but it was on record that it had been obtained through A.V.R.O.S.* and had been guaranteed by them to be from high-yielding palms. In their abundant production of female inflorescences the affected palms resembled the palms previously observed, but the absence of suitable data prevented accurate estimates of productivity or of losses being made.

Artificial pollination had been in operation on the estate on which the first outbreak occurred for at least a year before the investigation was begun. On the other estate this practice was initiated only two months before the palms came under observation.

The conclusions which have been reached regarding the origin of fruit-rot suggest that it may make its appearance in certain areas which are shortly coming into bearing. For this reason it has been considered desirable to place on record an account of the disease and of these conclusions.

External Symptoms and their Relation to the Course of the Rot.

The fruit-bunch is the only part of the palm which is affected. Various forms of rot, involving anything from a few fruits to an entire bunch, may occur. Two forms of fruit-rot (base-rot and stigma-end-rot) and two forms of bunch-rot (bunch-end-rot and early bunch-rot) may be distinguished. These are characterised in the following manner.

Base-rot of the fruit. A brown water-soaked lesion appears on the base of the fruit. As this enlarges the fruit becomes detached, but, held in place by its bracts, often continues to rot *in situ.*

Stigma-end-rot of the fruit. Sunken areas appear on the apex of the fruit, the latter eventually becoming shrivelled and dry.

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* Algemeene Vereeniging van Rubberplanters ter Oostkust van Sumatra.

Bunch-end-rot. The distal end of a bunch decays and can be pulled out with ease, leaving a basal portion which is frequently unaffected and completes its development.

Early bunch-rot or bunch-rot. As a rule the whole bunch is involved and commonly decays during an early stage of development. Early bunch-rot often resembles and may be confused with the decay of unpollinated bunches.

In the majority of cases the rot originates in the apex of the spine, which is a prolongation of the side-branch on which the fruits are borne (fig. 1), and travels downwards in the direction of the main axis of the bunch (fig. 2). When it reaches the point of attachment of a fruit, the base of the fruit becomes involved and the condition known as base-rot of the fruit is established (fig. 3). It follows that in these circumstances, the apical fruit of a side-branch is normally the first to be attacked, and examination of a bunch exhibiting base-rot of the fruit will show that if only a few fruits on any side-branch are affected they are almost without exception the upper ones, and that if only one fruit happens to be concerned it is usually the apical one. Occasionally, the rot starts from the apex of a bract, and then it may be found that the only fruit affected is one in a median position (fig. 4). Fruits which have thus rotted at their base rapidly lose resistance and become liable to secondary infections at the base and at the apex. The secondary infection at the apex gives rise to the condition described as stigma-end-rot.

As the rate at which the rot in a side-branch advances will be dependent on the state of resistance of the tissues, and the extent of its advance on the length of time during which it has been operating, it follows that at any particular moment of observation the symptoms exhibited by different bunches may show a wide range of variation. If the rot sets in at an early stage in the development of a bunch, or if its advance is rapid, the whole length of the side-branch and all the fruits on it may be affected long before the bunch is ripe. Conversely, if the onset of the rot is delayed, or its progress is slow, the bunch may ripen with the loss of only a few apical fruits. Further modifications in the symptoms may arise from the fact that the number of side-branches affected in a bunch may range from one to many.

When, due to early onset or rapid progress, the rot has travelled down the entire length of a side-branch, it begins to involve the tissues of the main axis of the bunch. From this situation it can, by peripheral spread, affect the bases of other side-branches, so that what at first appear to be anomalous cases are frequently found where the rot is travelling in an opposite direction to that normally encountered (fig. 5). By horizontal extension of the peripheral infection, or by penetration into the internal tissues of the main axis, or by the coalescence of centres of rot originating from two or more affected side-branches, the apex of the bunch itself may be cut off from nutrient supplies, and then the condition known as bunch-end-rot arises (fig. 6).

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Rotted tissue shewn in red.

Fig. 5.

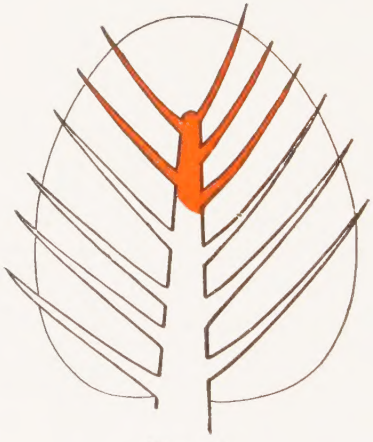

Fig. 6.

Rotted tissue shewn in red.

The condition known as bunch-rot, that is the state in which the entire bunch, or a very large proportion of the bunch is rotted, represents in some instances merely an extreme phase of the conditions already described, but in other cases it is apparent that some additional factor is operating. The conspicuous feature in these cases is the greater uniformity in the symptoms. The rot invariably sets in at a very early stage in the development of the bunch originating in a basal group of unpollinated side-branches situated on the right hand side of the bunch, and from there gradually extends into the main axis. Bunches thus affected always remain small. The fruits on the pollinated portion continue to develop so long as that part of the main axis, from which the side-branches bearing them arise, is not involved in the rot; but as a rule before their development has proceeded very far the entire main axis has decayed.

The additional factor to which reference has been made is therefore incomplete pollination. The constant occurrence of the unpollinated zone on the right hand side of the bunch seems to be due to the fact that the development of the female inflorescence is excentric in relation to the subtending leaf, the excentricity, in those cases which have come under observation, always tending towards the left, in such a manner that the right hand side of the inflorescence becomes shut in by the petiole, making it difficult for the pollen to gain access to the basal flowers.

Etiology of the Rot.

The decay of side-branches bearing unpollinated flowers is inevitable, but the spread of this decay to other parts of the bunch must be regarded in a different light, for experience shows that in normal circumstances its progress would be checked by the resistance of healthy developing tissue, and it is therefore to be supposed that it is only when this resistance is much impaired that the main axis and subsequently the entire bunch is liable to become involved. And, as in this type of rot, so in the types previously discussed, the rot of the fruits and of the bunches is considered to be due to an unchecked extension of natural decay, consequent on a loss of resistance in the affected tissues.

It has already been mentioned that the rot usually originates in the apex of the spine, and occasionally in the apex of the bract. Examination of normal bunches at all stages of development determines the fact that whilst the bulk of the tissue in these two appendages remains healthy, even up to the time the fruits are ripe, the first few millimetres of the apical tissue is always dry and decayed; and it is believed that the rot which spreads down the spine into the side-branch and thence to the main axis is merely the unchecked extension of this normal apical decay.

It will be appreciated that this explanation of the nature of the rot implies that it is due to the operations of saprophytic organisms, and is not a specific disease caused by a specific pathogen. The study of the organisms associated with the rot provides justification for this view.

Organisms Associated with the Rot.

Microscopical examination of tissue derived from the margin of the rot, in the spine, side-branches and main axis, has demonstrated that bacteria and nematodes are consistently present in this situation, the former in large numbers.

The constant occurrence of an organism in the margin or advance of a rot is evidence of its direct connection with the production of this condition. When at least two kinds of organism occur it will be agreed that either one invariably follows the other; that is, is secondary, or that both are equally concerned. If in this case the nematode were the primary organism; were in other words a parasite capable of advancing into healthy tissue, it should be found occurring in areas free from bacterial infection. But as such a state of affairs has not been observed it is to be assumed that this organism is a saprophyte.

To determine the rôle of the bacteria and the possibility of the presence of other organisms not observed in the sections, cultures were set up with tissue derived from the margin of the rot in various situations. From the thirty isolations thus made, five organisms were obtained in pure culture; a fungus and four species of bacteria. Study of the fungus isolation on various media has determined that it is a species of *Fusarium* belonging to the section *Martiella*. As a result of the examination of the morphology, tinctorial characteristics and physiological reactions of the bacterial isolations, these have been identified as:

1. A species of *Bacillus* belonging to the *B. mesentericus* group. This is a group of saprophytic organisms which includes forms occurring in the soil, in the intestines of herbivorous animals, and in decaying vegetable matter, and which is largely concerned in the breakdown of pectin and hemicelluloses.

2. A species of *Flavobacterium* resembling *F. diffusum*, a soil organism.

3 and 4. Two species of *Achromobacter* (a genus represented by forms found mostly in soil and water) which were readily distinguished from each other by certain physiological reactions.

The five organisms appeared in the orginal isolations in the following proportions:

Organism.	Percentage of cultures.
Flavobacterium sp.	40.
Achromobacter sp. (a).	40.
Bacillus (*mesentericus*).	30.
Fusarium sp.	12.
Achromobacter sp. (b).	10.

A species of *Gloeosporium* was isolated from the base of base-rotted fruits and from the apex of fruits exhibiting stigma-end-rot, but as this fungus was not once recovered from the margin of the rot, its presence in these situations must be held to be due to a secondary infection.

Pathogenicity of the Organisms.

In order to test the pathogenicity of the five organisms isolated from the margin of the rot they were inoculated in triplicate into the spines of developing bunches on oil palms at the Central Experiment Station, Serdang. Pure cultures were introduced into incisions made under aseptic conditions and each inoculated spine was subsequently bound with tape. A control inoculation was established for each of the five sets. Inoculated spines representative of each set were removed and examined at intervals of twenty days, five weeks, and two months after inoculation. The controls were removed at the same time as the last series of inoculated spines. Comparison of the inoculated spines with the controls showed that there was no significant difference in the amount of decay that had occurred, which in no case had advanced for more than a few millimetres into the tissue surrounding the incision. Furthermore, it was found that this decay had made no more progress in two months than it had made in twenty days. It may therefore be accepted that not one of the five organisms is capable of invading healthy oil palm tissue. They are saprophytes whose association with the occurrence of fruit-rot is to be interpreted as evidence that the resistance of the tissues of the affected bunches had been lowered prior to their attack.

Resistance and Nutrition.

The study of the organisms associated with the rot thus tends to confirm the opinion, derived from consideration of its course, that it is merely an abnormal extension of natural decay due to a loss of resistance in the affected tissues. If this view is correct, then it is of fundamental importance to determine the cause of this decline in resistance.

Resistance of this nature, that is, the normal resistance of functioning tissue to infection by saprophytic organisms, is a state whose existence is dependent on the vigour of the plant, or, more precisely, on the vigour of its protoplasm. The maintenance of this vigour is itself dependent on the maintenance of normal metabolism; so that a decline in resistance implies the existence of factors which are responsible for metabolic or nutritional disturbances.

Effect of a Nutritional Disturbance.

If the invasion of the bunch tissues by saprophytic organisms is dependent on a decline in resistance, which is itself consequent on a disturbance of normal metabolism, it follows that it should be possible to induce the rot artificially by a suitable nutritional disturbance.

It was to be supposed that such a disturbance would supervene if the nutrient supply which reaches the bunch by way of the peduncle were severely dislocated. To effect this dislocation it would only be necessary to kill a sufficiently large area of tissue in the peduncle. In order to accomplish this, a 0.5 per cent. aqueous solution of mercuric chloride was injected by means of a syringe into $\frac{1}{2}$ inch holes drilled in the bases of the peduncles of three developing fruit

bunches. The use of mercuric chloride presented certain advantages. In the first place it is highly toxic to all living tissue and could be relied upon not only to kill all the cells with which it came into contact but to inhibit a rapid invasion of the wound by saprophytes. Furthermore, the fact that it tends to form insoluble compounds with protoplasm and simple proteins would prevent its translocation and thus localise its effect. At the time of treatment, two of the bunches were in an early stage of development, the third was almost fully formed. The fruits on all were black and unripe.

The bunches were first examined thirteen days after injection. The two youngest appeared unaffected. The third bunch had begun to change colour and several fruits borne at the apices of the side-branches were loose or had fallen and were found to be rotted at the base. This bunch was removed from the palm and dissected seven days later. Its condition was typical of that exhibited by bunches affected with base-rot of the fruit. Most of the apical fruits of the side-branches had rotted and fallen, although the bunch was not yet fully ripe. Examination of the course of the rot showed that it had originated in the apex of the spine and travelled downwards, involving the bases of the fruits in its path. Some decay had set in at the base of the peduncle, where it had been wounded and injected, but a large expanse of healthy tissue separated this from the decay in the side-branches, leaving no doubt that the latter had been induced, not directly, but indirectly by the disturbance at the base of the peduncle.

The two bunches which had been injected when immature were kept under observation for two months without any development of fruit-rot being observed. As the peduncles were themselves in an active state of growth at the time of treatment it was considered that the effect of the injections had possibly been neutralised by the elaboration of compensating vascular tissue. Each bunch was therefore injected for a second time. Cases of base-rot of the fruit were observed nine days later on both bunches, which were still black and unripe. One bunch was removed and dissected. The rot was found to have progressed in the typical manner, that is, down the spine, or bract, and thence into the base of the fruit. The disintegration of the peduncular tissue resulting from the injections was definitely localised and separated from the rot in the spines by an extent of healthy tissue covering the entire length of the bunch.

The experiment showed, therefore, that typical fruit-rot may be induced by dislocation of the nutrient supply and confirms the opinion that palms so affected have been predisposed to the attacks of saprophytic organisms by a nutritional disturbance.

Cause of the Nutritional Disturbance.

A nutritional disturbance of this kind, which is not due to infection of the tissues by a parasitic organism, must be the outcome of some adverse environmental condition. The normal type of Deli palm can be grown on Malayan soils without being subject to severe outbreaks of fruit-rot, although isolated cases of base-rot and of bunch-end-rot are occasionally encountered. Both the outbreaks of fruit-rot which have been investigated occurred on palms

which were representatives of high-yielding strains. So whatever may be the nature of the adverse environmental factor, it would appear to become operative only when high-yielding strains are cultivated. Such a correlation suggests that the predisposing nutritional disturbance is the result of a soil deficiency.

If this interpretation is correct, then the incidence of the rot will be influenced by artificial pollination, providing that this practice tends to increase the number of developing fruits. When the soil is already deficient the effect of artificial pollination will be to aggravate the shortage and intensify the outbreak. If, however, the deficiency is merely potential, artificial pollination may then become the factor which induces the deficiency and the disease.

The proof of these hypotheses is a matter for experiment. Suitable experiments are in progress.

Recommendations.

Artificial Pollination.—Until there is evidence that, under any particular Malayan conditions, certain high-yielding strains of palms are capable of bringing to maturity their full crops of naturally-pollinated bunches, artificial pollination should not be practised. But if such conditions appears to exist and it is proposed to initiate a programme of artificial pollination, it must be borne in mind that this practice may itself induce fruit-rot.

Manurial Treatment.—If fruit-rot is primarily a deficiency disease then it is clear that some form of manurial treatment is called for. But it is not possible in the present state of knowlege to make any specific recommendation.

Removal of Rotting Bunches.—The extent of the benefit to be derived from the removal and burial of rotting bunches is open to question. Were the operation performed early enough, a useless translocation of nutrients would be prevented. But it is doubtful whether such treatment would do much to reduce the prevalence of the associated saprophytes, in view of their normal abundance.

Rotten Fruit and the Factory.—Rotten fruit must be regarded as a total loss and should not be permitted to enter the factory, otherwise the acidity of the oil will be increased.

Summary.

1. A rot affecting the fruit-bunches of certain high-yielding strains of the oil palm has recently become prominent.
2. The rot may assume various forms. Four main types are distinguished. These are shown to have a common origin.
3. Study of the organisms associated with the rot, and of its course within the bunch, has led to the conclusion that it is caused by a saprophytic invasion of tissues which have been predisposed to attack by a decline in resistance.
4. This decline in resistance is held to be due to a nutritional disturbance.
5. A typical form of the rot has been induced by an artificial dislocation of the nutrient supply.
6. It is suggested that the predisposing nutritional disturbance is brought about by a soil deficiency, and it is considered that this deficiency may be either aggravated or induced by artificial pollination.

CONTROL OF INSECT PESTS IN STORED *DERRIS*

BY
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In Malaya, dried *Derris* root is liable to damage by several species of beetles,* in both the larval and adult stages. The adult beetles will attack the root a few days after harvesting, but it is more attractive to them after a longer period when the moisture content is low.

The adult beetles lay their eggs in cracks and irregularities on the outside of the root, and the larvae on hatching, bore into the internal tissues and gradually reduce them to powder. On attaining the adult stage (the period from egg to adult being approximately nine weeks) the beetles remain in the root for a short time, then bore a way out and fly off.

Infestation, unfortunately, is not always apparent, since it is only the adults which eject frass from their tunnels; thus it is necessary to take samples of root and split them to be able to ascertain whether larvae or adults of the beetles are present.

Frequently, however, beetles which have laid their eggs on root, also bore into it and in doing so, betray their presence both by the holes they gnaw and also by the frass which they scatter from the tunnels. The presence of frass is generally an indication that the damage is extensive, and that immediate steps must be taken, if complete destruction of the root is to be arrested.

Unless the store is provided with windows covered with wire gauze of 1 mm. mesh, and with doors that fit perfectly so as to leave no crevices through which adult beetles may gain entrance, the protection of *Derris* root against infestation by beetles is almost impossible, in view of the fact that it is a common practice to accumulate stocks of root until the quantity is sufficient to justify export.

It is highly important that the store be kept clear of odd pieces of root, remaining after the packing of former consignments, since such pieces provide material in which the beetles can breed and eventually spread to fresh stocks.

The question of re-infestation of *Derris* in transit on board ship is a difficult one, but if roots are carefully graded and all portions of more than about half an inch in diameter are rejected, the danger of infestation will be greatly minimised. It may be mentioned that such roots so rejected have little toxic value.

Complete elimination from infestation can be secured if the root is ground to powder and packed in sealed tins, but for this purpose a special type of mill is essential, since, during grinding, the cogs of the wheels are inclined to become clogged and need frequent cleaning.

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* *Sinoxylon anale* Lesne., *Xylopsocus capucinus* F., *Dinoderus minutus* F. (these are the most important) *Sinoxylon rugicauda* Lesne., *Sinoxylon malaccanum* Lesne., *Dinoderus bifoveolatus* Woll., *Xylothrips flavipes* Illig., *Perissus lactus* Lameere, *Pterolophia melanura* Pasc., *Minthea rugicollis* F., *Hypothenemus eruditus* Westw. and *Alphitobius laevigatus* F. These species have been fully dealt with in the "Coleopterous Pests of Stored *Derris*", Dept. Agric. Scien. Ser. No. 14, 1934.

Another method which has been found effective in preventing infestation is to cut the dried root into pieces of about 2 inches in length which are then packed in a plywood chest of the kind used for the export of tea or rubber.

A chest measuring 19 x 19 x 24 inches will hold about 100 lbs. of dried root. This method of dealing with *Derris* root has been practised with satisfactory results by one local firm.

Root treated in this manner should be dried, either in the sun or in a hot-air dryer, chopped and packed expeditiously, and if any root is left over, this also should be packed temporarily, to protect it from infestation until an opportunity occurs to include it in a further consignment.

If on examination of a stock of root, it is found that beetle borers are present, and that the damage is not so far advanced as to render the root worthless, the following methods for the destruction of the beetles and their larvae are recommended.

One method which has been found effective, in killing larvae, pupae, and adults, is to remove the root from the store and expose it for about 5 hours to bright sunshine. More rapid results will be obtained if the root can be spread on iron sheeting, or on a cement floor. Since this method is both cheap and effective, its occasional adoption, especially if no store is available in which stocks can be adequately protected, will possibly obviate considerable monetary loss.

During periods of wet weather, or when the sky is overcast, and consequently there is insufficient sunlight to be effective, it will be necessary to fumigate the root. For this purpose, an air-tight fumigatorium, or a room which is sufficiently air-tight to ensure the minimum escape of vapour, is essential.

The chemical recommended for fumigation is carbon bisulphide, a somewhat expensive substance, but it has satisfactory penetrating qualities and is not difficult to handle.

It should be emphasised, however, that great care must be taken not to inhale it, and also to keep it away from fire since it volatilises rapidly on exposure to the air and forms a vapour which is highly inflammable and explosive when mixed with a certain proportion of air. Another property of carbon bisulphide is that it is heavier than air. It should, therefore, be applied at the top of a pile of root, preferably being sprayed on cloth or sacking.

The quantity recommended for use in fumigation is 2 to 3 pounds per 1000 cubic feet, the amount depending, to some extent, on the amount of root to be fumigated and the degree to which air can be excluded from the chamber.

Fumigation with carbon bisulphide, to be effective, should be extended over a period of 72 hours.

Subjecting infested root to heat, without scorching, for three days is also a satisfactory method of destroying beetle borers, and if a crop of *Derris* is being grown on a rubber plantation, it will be found convenient to use the smoke-house for this purpose.

A DISEASE OF THE DURIAN TREE

BY

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Introduction.

The durian tree (*Durio zibethinus*) which is indigenous to the Malay Peninsula and Netherlands India is looked upon as one of the most valuable and desirable trees in the somewhat mixed collection of fruit trees grown in the Malay small holdings, since the fruit, which has a unique flavour, is always readily saleable in the local markets and in addition, is valued for its tonic food value.

There are no former records of any serious diseases of the durian tree in Malaya, probably due to the fact that the cultivation of the tree is confined mainly to the small holdings from which deaths are not readily reported.

Recently, however, a disease which has been identified as claret-coloured bark canker (or patch canker), has appeared on an estate in Penang where there is a comparatively large area devoted to the cultivation of this fruit.

The Disease.

The disease resembles claret-coloured bark canker of the rubber tree in that there is, at first, no external indication of the presence of a fungus in the tissues of the bark until a dark liquid begins to exude from one or more spots on the trunk, sometimes near or at the collar. Boring beetles soon attack the bark at these spots and bore into the stem. Healthy cortical tissue of the durian tree is pinkish in colour but, when it is attacked by the disease, areas of a darker, dull-red colour, bounded by an irregular margin, are formed and these extend in as far as the wood of the stem.

The disease was reported in May 1934, and has not yet been studied in detail, but from information received from the grower of the affected trees, it appears probable that the disease does not kill a tree quickly, but that the canker spots in the bark gradually increase in size and may coalesce until a considerable portion of the bark is killed and becomes riddled with boring beetles. Finally, the branches die back owing to dislocation of the food supplies and the tree dies. A tree may not die until more than a year after infection has occurred.

The disease appears to have been present in this locality during the past ten years and has annually killed a number of trees. In the area examined, a fair number of trees were found to be infected.

The Cause of the Disease.

The fungus *Phytophthora palmivora* Butl. was isolated from the cortex of a diseased tree and when inoculated into a healthy tree, reproduced the

first symptoms of the disease within seven days. The fungus was again isolated from the inoculated bark, thus establishing that this fungus is the cause of the disease.

The fungus has already been recorded as a cause of a similar disease of the rubber tree; other species of the same genus and a species of Pythium (*P. complectens*), have been found to attack rubber trees in Malaya.*

Pythium complectens has recently been observed to attack the collar of rubber trees which have been affected by lightning†, but in the case of the disease of the durian tree there was no indication of lightning injury and the fungus *Phytophthora palmivora* is undoubtedly a primary parasite, capable of directly attacking this tree.

Phytophthora spp. are only virulent in wet or damp weather, since they only produce the active motile spores—known as zoospores—in the presence of water. These zoospores are the principal agents in the spread of infection. During dry weather, the mycelium of the fungus in the bark of affected trees may cease to extend in the tissues and if dry weather continues for a prolonged period, the diseased bark may scale off, leaving a canker on the stem.

It is probable that rapid extension of the disease in the cortex occurs mainly during wet weather and that, during intervening spells of dry weather, the growth of the mycelium is slight, so that the disease does not kill a tree quickly under normal weather conditions. When the disease is situated at the collar, or if it extends to the collar, the probability of its more rapid extension is greater owing to the moister environment at soil level.

The Importance of the Disease.

The presence of an infectious and fatal disease in a perennial crop is a matter for concern, particularly in the case of valuable trees which take some years to reach maturity.

Phytophthora palmivora is, furthermore, likely to spread from a diseased tree to other economic crops in the vicinity. A strain of the fungus is the cause of coconut bud-rot in India and certain other countries, but, so far, this disease has not been recorded on the coconut palm in Malaya. Black stripe and patch canker are, however, two diseases which may appear in rubber trees growing near infected durian trees, and it is also probable that durian trees may become infected if these diseases are present in neighbouring rubber trees.

Treatment of the Disease.

The only feasible method of treating this disease is excision of the diseased bark. It is recommended that the bark should be scraped until the extent of the diseased patch is determined. The affected bark should then be isolated by cuts extending to the wood; the diseased bark should be removed and burnt

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* Thompson, A. Phytophthora species in Malaya. *Malayan Agricultural Journal*, 17 : 53—100. 1929.

† Sharples, A. Lightning Storms and their Significance in Relation to Diseases of (1) Cocos nucifera and (2) Hevea brasiliensis. Ann. Appl. Biol. 20 : 1—22. 1933.

and the wound painted with a weak solution of a disinfectant such as 2 per cent. Izal, finally covered with tar, or with a mixture of melted asphalt (60 parts) and kerosene oil, or solar oil (40 parts).

Treatment is difficult if the disease is in an advanced stage; consequently, growers are advised to inspect the trees periodically, particularly if any of the durian trees in the neighbourhood have died from a disease showing the symptoms described above.

Summary.

1. A disease of the durian tree is described.
2. The disease, which is similar to the disease of rubber trees known as claret-coloured bark canker or patch canker, is caused by the fungus *Phytophthora palmivora*.
3. It is considered that the fungus is likely to spread to rubber trees from adjoining, diseased durian trees and *vice-versa*.
4. Recommendations for treating the disease are given.

CONDITIONS ON SMALL RUBBER HOLDINGS IN MALAYA

2nd Quarter, 1934.

Prepared by the Economic Branch of the Department of Agriculture, S.S. and F.M.S. in collaboration with the Field Branch of the Department.

Rainfall.

In Kedah April was wet. In early May also the rainfall was considerable, but that of June was below average. In the Northern Circle of Johore, April and May were generally dry, except for some very heavy showers. During June although the rainfall was low it was more evenly distributed. In the Southern Circle, April and May were wet months while in June drier conditions prevailed in most districts. At Mersing the rainfall throughout the quarter was sparse. In Selangor, April was wet, but May normal. In June the weather was wet in the inland districts and dry on the Coast. In Perak, the total rainfall was heavier than usual, except on the coastal flat land in Lower Perak. In April and June the rainfall was heavier than usual whilst in May it was generally below the average for the month.

Prices.

The report of an international agreement for the restriction of rubber production and the announcement that it would be brought into force on 1st June, resulted in a quick rise in the price of the commodity. As will be seen from the accompanying Table I, there was in most States a considerable difference between the highest and lowest prices paid in April and May, due partly to rising prices and also, no doubt, to a certain amount of speculation on the part of buyers. Prices varied within narrower limits in June when the situation became clearer and the Singapore price appeared more stable.

The average Singapore prices of standard smoked sheet in cents per lb. were as follows:—April 18.75, May 21.35, June 21.82, while the Singapore prices at the end of each month in dollars (Straits) per picul (133⅓ lbs.) for small-holders' rubber were as follows: April: smoked sheet $25.50, unsmoked sheet $23.50, scrap $9.50. May: smoked sheet $16 to $24, unsmoked sheet $12 to $31.50, scrap $2.50 to $16. June: smoked sheet $26, unsmoked sheet $22—$23.50, scrap $11.

It will be noticed that with the advent of restriction, scrap rubber became unsaleable in almost every district, the issue of coupons in most cases being sufficient to cover only the production of sheet.

Most small dealers preferred to purchase wet rubber, as, being covered by coupons, it enabled them to accumulate coupons in excess of the dry rubber held by them. It is suggested that many dealers at port have thus obtained coupons in excess of rubber held by them to the extent of 8 per cent.

Table I.

Lowest and Highest Rubber Prices Paid by Local Rubber Dealers.

(In Straits dollars per picul (133 1/3 lbs.))

2nd Quarter 1934.

	Penang	Perak	Selangor	Negri Sembilan	Pahang	Malacca	Kedah	Johore
			APRIL					
Smoked sheet	21.00-25.50	19.70-25.00	20.00-26.00	19.50-25.15	18.00-30.00	23.00-30.00	20.00-28.00	19.00-24.00
Unsmoked sheet	20.50-24.50	17.00-24.00	17.00-24.00	17.20-23.00	14.00-23.20	20.00-28.00	17.00-24.00	16.00-28.50*
Scrap	5.00-11.00	5.00-11.00	6.00-11.00	4.00-11.00	4.00-11.50	5.00-14.00	8.00-15.00	3.00-10.00
			MAY					
Smoket sheet	23.00-32.00	18.00-31.50	20.00-31.00	13.00-32.35	13.50-31.70	18.00-32.00	21.00-28.00	20.00-33.00
Unsmoked sheet	20.00-31.50	14.50-28.00	19.00-28.00	12.00-31.00	11.00-29.00	18.00-26.00	18.00-25.00	16.00-29.00
Scrap	4.00-15.00	4.00-14.75	4.00-16.00	3.00-14.00	3.00-15.00	4.00-16.00	8.00-14.00	2.00-12.00
			JUNE					
Smoked sheet	24.00-25.00	21.00-26.50	22.00-27.40	22.50-27.00	18.00-27.00	24.00-26.00	22.00-26.50	20.00-26.50
Unsmoked sheet	22.00-24.00	20.00-25.50	20.00-24.00	20.00-25.00	16.00-25.00	22.00-25.00	18.00-24.00	15.00-25.00
Scrap	10.00-15.00	Unsaleable	4.00-7.00	Unsaleable	Unsaleable	Unsaleable	10.00-15.00	3.00-8.50

*$28.50 in one centre only. The average highest price was about $22.00

Table II.

Mean of Lowest and Highest Rubber Prices Paid by Local Dealers.

(In Straits dollars per picul (133 1/3 lbs.))

2nd Quarter 1934.

	Penang	Perak Av. 17 centres	Selangor Av. 7 centres	Negri Sembilan Av. 6 centres	Pahang Av. 6 centres	Malacca Av. 3 centres	Kedah Av. 4 centres	Johore Av. 12 centres
				APRIL				
Smoked sheet	22.25-24.75	20.95-24.01	22.25-24.48	21.30-24.33	20.32-24.85	24.00-27.00	21.75-24.70	20.96-23.05
Unsmoked sheet	21.60-23.80	18.32-20.62	19.62-21.05	19.75-22.61	17.30-21.96	21.33-25.00	18.75-21.25	19.96-22.36
Scrap	8.20-10.30	6.39-7.96	6.83-8.43	5.16-8.83	6.42-8.65	6.33-11.66	9.25-11.37	5.83-8.36
				MAY				
Smoked sheet	24.12-30.25	20.17-26.32	21.30-30.08	19.75-29.94	19.16-30.03	21.00-27.66	24.12-25.75	21.80-27.99
Unsmoked sheet	23.40-28.90	16.13-21.40	20.83-26.00	13.60-25.40	15.80-27.12	19.33-25.66	21.25-25.50	18.87-24.38
Scrap	7.60-13.60	5.00-7.93	6.00-10.50	3.60-9.90	5.42-11.75	5.66-9.33	8.50-10.87	5.83-8.27
				JUNE				
Smoked sheet	23.62-25.00	22.67-25.18	24.22-26.32	23.00-25.70	21.67-25.32	24.33-26.00	23.50-25.62	22.55-24.69
Unsmoked sheet	22.10-23.70	20.23-22.77	20.66-23.33	21.10-23.83	19.80-23.30	22.66-24.33	20.50-23.37	19.92-22.73
Scrap	11.50-14.00	2.00§-3.50§	5.00‡-3.50‡	Unsaleable	Unsaleable	Unsaleable	10.00*-13.75*.	6.16†-8.00†

*Quotations at 2 centres only.
‡Quotations at 2 centres only.
†Quotations at 3 centres only.
§Quotations at 3 centres only. Unsaleable elsewhere.

Table I shews the lowest and highest prices at which rubber was purchased by dealers in each State. Such figures are apt to be misleading, as the highest or lowest price may refer to but isolated purchases. Table II, which shews the mean of lowest and highest prices paid, is a more certain indication of the range of prices which obtained during the period under review.

A trade has already started in the sale of coupons. It was reported from Selangor, for instance, that small-holders sold their coupons without rubber to dealers at $11 to $12 per picul, and rubber without coupons at a price of $10 to $12 per picul, where the price offered for rubber with coupons was $27 per picul.

Tapping.

In many parts of the country during the period of rising prices and in anticipation of the introduction of restriction, tapping was severe on small holdings, the owners wishing to take advantage of the more favourable prices ruling. The period following the announcement of restriction and prior to it coming into operation, was one of some uncertainty and there was, therefore, some easing-off of the severity of tapping. From the beginning of June there was some decline in the area tapped and an improvement in the tapping generally, as the owners realised that they were able to obtain sufficient rubber to cover their coupon issue without recourse to drastic systems of tapping. It is reported from Kedah that heavy rains interfered with tapping at one period, but that afterwards heavy tapping was general. Johore reports that the high price of rubber resulted in the production of rubber from many tappable trees which had previously never been tapped.

Areas out of Tapping.

The method of estimating the area untapped on small holdings by means of counting the number of such holdings along the sides of main roads, and applying the percentage thus obtained to the total area of small holdings in the area, was repeated in June. It should be remarked that this method, while not claiming great accuracy, provides a useful index figure of the variations of the amount of tapping on such holdings.

The results of the present survey are stated in Table III, from which it will be seen that in all States covered by the survey, there was a tendency to reduce the area tapped.

The total area of tappable rubber on estates of less than 100 acres which was untapped in the Federated Malay States at the end of June, 1934, is estimated on the foregoing system to amount to about 54,600 acres, as compared with 34,950 acres at the end of March. The total area untapped in the Straits Settlements at the end of June was 18,800 acres as compared with 9,900 acres at the end of March.

Table III.

Estimated Acreage of Tappable Rubber which was out of Tapping on Holdings of less than 100 Acres, at the end of June, 1934.

PERAK				SELANGOR				NEGRI SEMBILAN				PAHANG			
District	Total Tappable area	Total area untapped	Percentage	District	Total Tappable area	Total area untapped	Percentage	District	Total Tappable area	Total area untapped	Percentage	District	Total Tappable area	Total area untapped	Percentage
Batang Padang	37,288	1,500	4	Klang	18,879	2,100	11	Seremban	19,241	1,900	10	Raub	7,361	1,000	13
Kinta	34,180	1,400	4	Kuala Langat	29,263	1,200	4	Tampin	17,947	3,200	18	Kuala Lipis	15,951	300	2
Kuala Kangsar	43,485	5,200	12	Ulu Langat	38,897	1,900	5	Kuala Pilah	17,470	3,800	22	Bentong	13,600	4,000	31
Upper Perak	13,774	1,500	11	Ulu Selangor	30,632	1,800	6	Jelebu	6,270	800	13	Other Districts	31,223	4,500	14†
Larut & Selama	51,407	3,600	7	Kuala Lumpur	21,174			Port Dickson	10,653	1,100	10				
Krian	9,751	5,600	58	Kuala Selangor	9,379	4,000	13								
Lower Perak	47,937	4,800	10†												
	237,822	23,600	10		148,194	11,000	10		71,581	10,800	15		68,135	9,800	14

MALACCA				PENANG & P. WELLESLEY				SINGAPORE			
District	Total Tappable area	Total area untapped	Percentage	District	Total Tappable area	Total area untapped	Percentage	District	Total Tappable area	Total area untapped	Percentage
Central	17,687	500	3	North	3,241	300	10	Singapore	12,781	1,000	8
Alor Gajah	31,387	6,000	19	Central	7,067	1,300	19				
Jasin	24,971	4,000	16	South	8,149						
				Dindings	7,279	4,900	68				
				Penang	11,114	800	7				
	74,045	10,000	14		36,850	7,300	20		12,781	1,000	8

The percentage of areas out of tapping in March, 1934, was as follows:—Perak 7, Selangor 5, the Negri Sembilan 8, Pahang 9, Malacca 9, Penang and Province Wellesley 5, Singapore 8.

† Estimated from mean percentage for remainder of State.

Condition of Holdings.

There was a very marked improvement in the condition of small holdings in all States. Clearing of undergrowth and the general cleaning up of holdings was general. It is stated that this was not due only to the improved financial position of the owners, but in many cases to the belief that a reduction will be made in coupon issue under the rubber regulation scheme in the case of holdings that are overgrown.

No serious cases of soil erosion have been reported during the quarter.

Diseases.

In Kedah, bark diseases became evident in old infected holdings with the advent of wet weather and the usual methods were adopted for their control. The distribution of a fungicide by the Department was continued in three Districts.

Johore reports state that the dry spell experienced during the first two months of the quarter was instrumental in effecting an improvement in the condition obtaining in the badly-infected area in the Northern Circle. The easing of the economic position of the small-holder, coupled with the advent of rubber regulation, led to an increased use of disinfectants in most areas. The fear that the assessment rate for small holdings will depend to some extent on the absence of disease, led many small-holders to take more energetic measures to check mouldy rot disease in their holdings. The outbreak of oidium disease in several districts reported during the previous quarter, diminished in intensity early in the present quarter and infected areas rapidly recovered. Several cases of pink disease were found in the Kluang District; treatment and control measures were undertaken early and the attack was confined to a few trees only. Only a few cases of root disease were reported and these were effectively controlled.

Mouldy rot disease was well under control in most areas in Selangor. In Perak this remains the only disease of any importance. Increased control measures were taken by the owners, greater use being taken of the facilities provided by the Department for the supply of approved fungicides for its treatment. No reports of *oidium heveae* were reported.

Grades of Rubber.

Considerable variations of importance have been noted in the grades of rubber purchased by dealers as is shewn by the following figures.

Kedah.—The percentage amount of smoked sheet declined in all districts by about 20 per cent., while unsmoked sheet increased to a similar extent. In Alor Star the average percentages were :—smoked sheet 70, unsmoked sheet 16, scrap 14; Sungei Patani—smoked sheet 34, unsmoked 57, scrap 9; Baling—smoked 23, unsmoked 66, scrap 11; Kulim—smoked 29, unsmoked 32, scrap 39 (scrap decreased, while smoked shewed an increase during the quarter).

Johore.—The percentage of the different grades of rubber sold, varied enormously as between Districts. In Batu Pahat and Benut over 70 per cent. was smoked sheet, most of the remainder being unsmoked sheet; in Tangkak, Muar, Segamat, Kluang, Senggarang and Johore Bahru the average was: smoked 46, unsmoked 45, scrap 9; while at Panchor, Pontian and Kota Tinggi purchases were almost entirely of unsmoked sheet.

Selangor.—Smoked sheets were still being prepared in the Coastal Districts, while in the inland Districts both smoked and unsmoked were prepared. Improvement in quality of smoked sheet was reported in one District.

Perak.—In Perak North, only in Taiping was any considerable amount of smoked sheet purchased (37 per cent.). In 7 other centres the purchases averaged 72 per cent. unsmoked and 18 per cent. scrap. In Perak South, with the exception of Tanjong Malim (74 smoked, 16 unsmoked, 10 scrap) the percentage purchases at 3 centres were: smoked 18, unsmoked 70, scrap 12. In the Krian District percentage purchases were smoked 10, unsmoked 60, scrap and lump 30: Selama sub-District smoked 80, unsmoked 20. In Kuala Kangsar the percentages were smoked 41, unsmoked 21, scrap 38.

It will be noted that the above figures do not reflect the cessation of purchase of scrap and very low-grade rubber which was a feature of the June market.

General.

No cases of budding of rubber or of new planting have been brought to notice during the quarter. Furthermore, owing to the more favourable price of rubber, there was no evidence of abandonment of rubber holdings in favour of other forms of cultivation.

The position of the small-holder has considerably improved, but the full effects of the improvement will not be apparent until next quarter when his debts to Government for land rent will have been liquidated and the increased cash return from the sale of rubber can be devoted to his own needs.

The quality of rubber marketed tends to improve, not only on account of the lack of demand for scrap but by reason of a growing appreciation of the fact that higher grades command higher prices. It is reported, for instance, that the import of rubber-mangles has increased in Kelantan where they are purchased by the small-holders or hired for the purpose of preparing a better grade product.

Miscellaneous Article.

MALAYAN GRADED PINEAPPLES.

A commercial consignment of pineapples graded in accordance with the provisional grading standards drawn up by the Department of Agriculture, S.S. and F.M.S., was packed at a canning factory in Singapore during February 1934. The consignment consisted of 87 cases, comprising 25 cases of Golden Cubes, 25 cases of G.A.Q. Cubes, 25 cases of Golden Slices (spiral cut) and 12 cases G.A.Q. Slices (spiral cut). Fruit was dear and scarce at the time of packing. The consignment was inspected by the Agricultural Field Officer, Singapore, before despatch and passed as conforming with the grading standards. It was despatched to the Agent, Malayan Information Agency, early in March 1934. All cases and tins were clearly marked to show their grade and the consignment was accompanied by a grading certificate.

It should be emphasised that the consignment was packed by the factory and was only inspected by the Agricultural Field Officer, Singapore, to ensure that it conformed with the grading standards. The standards achieved, therefore, should be capable of attainment in any factory, provided that a supply of fruit of average size and ripeness is obtainable. The consignment thus represented a definite practical commercial experiment, although it was considered to represent the upward limit of the respective grades.

The Agent, Malayan Information Agency, was requested to bring this consignment to the notice of the trade and to effect a sale thereof on behalf of the Department of Agriculture.

The cost of the consignment was—

87 cases at $3.67	...	$319.29
Freight and Shipping Charges	...	94.74
		$414.03

The consignment was sold at an all round rate of 2s. 9d. per dozen tins or 11s. per case, delivery and labelling at buyers' charge. The market price of the day was 2s. 10d. per dozen, labelled and delivered. The price of 2s. 9d. was considered to be equivalent to 3s. 1d. labelled and delivered, so that it represented 3d. more than the price of the day, a margin stated by the trade to be considerable.

Th actual sum realised for the sale of this consignment was :

87 cases at 11s. = 957s., equivalent to $410.14.

The average sale price per case, after deducting shipping and handling charges was $3.62. In considering the price realised, allowance must be made for the fact that the consignment was small, so that the grading charges were pro-

portionately higher than those on a large consignment and that the price obtained was an average for all grades.

In connexion with the sale of the consignment, the Agent, Malayan Information Agency, writes —

> "There is no 'market' for pines in the sense that there is for many commodities. By this I mean that there is no central place where pineapples are examined and then bid for in the same way, *e.g.* as there is for wool.
>
> "All pineapples are sold by private treaty between the merchant and either the broker or the distributor and it is therefore impossible to obtain competitive bids for a small consignment from people with a long established connexion either with a particular canner or a particular shipper."

He further points out that in practice, the labelling is haphazard and unsystematically done so that the ultimate purchaser has, in very many cases, no idea that there are different qualities. The result is that there is only a very slight difference between the prices of different grades and the premium on the better quality is almost negligible.

In order to arrive at the opinion of the trade on the quality of this consignment, the Agent invited 25 merchants, dealers and distributors to inspect samples and to write their opinion for his confidential information. Moreover, Mr. Banner, Mr. Graham and himself, all being officers of the Agency, made detailed inspections of two sets of samples.

In sampling the consignment, the Agent noticed that there was a very large sedimentary deposit when the syrup was allowed to stand for a few minutes in a glass. Consequently, the syrup was analysed with the following satisfactory result —

> "(1) Golden Slices — Sugar 16.91 per cent.
> (2) Golden Cubes — 16.42 do.
> (3) G.A.Q. Slices — 16.43 do.
> (4) G.A.Q. Cubes — 16.94 do.
>
> "The above figures are for total sugars expressed as sucrose in the syrup.
>
> "The sediment is essentially similar in each can and consists of vegetable tissue from the fruit, together with a number of crystals or raphides of crystallised calcium oxalate. The formation of such crystals is fairly common in pineapple products. The sediment is quite free from metals."

The results of the detailed inspection of the two sets of samples by the officers of the Agency may be summarised as follows. Details are given in the Appendix.

G.A.Q. Cubes.	Sample 1.	"Below G.A.Q. average".
	Sample 2.	"Cubes uniform in size, fair colour, can be classified as good".
G.A.Q. Slices.	Sample 1.	"Taking all together is an improvement on present G.A.Q.".
	Sample 2.	"Fair sample of G.A.Q.".
Golden Cubes.	Sample 1.	"Up to standard of average Golden but not superior".
	Sample 2.	"As a whole under colour, fruit firm and uniform".
Golden Slices.		"Fair Golden".

The examination revealed considerable differences in the contents of the different tins.

There was considerable variation in the opinions expressed by the representatives of the trade as a result of their examination of the samples. The following extracts illustrate this —

(*a*) "The GOLDEN quality were perfect of their kind and if it could be arranged that all shipments of the G.A.Q. quality Cubes were up to the standard submitted, there could not be any cause for complaint by either the trade or the consumer. We feel sure that if this standard could be maintained and guaranteed, the article would command higher prices than have ruled for some considerable time.

"The G.A.Q. Slices were inferior to the standard required and such quality would do harm to the trade."

(*b*) "We would suggest that if you ship only Golden quality and G.A.Q. quality equal to the samples which we inspected the business would be put on a very much firmer basis."

(*c*) "I criticised the quality of the G.A.Q. and made them below current standards. Those since inspected at my request by ..... apparently turned out better."

(*d*) "1½ *Tall Golden Slices.* The sample tins which I saw at your office were in my opinion, a very good delivery for this grade, the fruit being of good colour and texture. The workmanship was good, and if deliveries could be kept up to this standard, I consider that they would meet with a good reception.

"1½ *Cubes.* Here again, the colour and texture were good, but a little more careful workmanship could be shown in the cutting of the cubes. Some of the edges of the cubes were ragged, and if this could be avoided, I think this packing would be entirely satisfactory to this market.

"1½ *Tall G.A.Q. Slices.* I was very impressed with the quality of this particular package. If deliveries could be made of a quality similar to that which I saw, I think it probable that the demand could be increased.

"1½ *Tall Cubes.* I should say that your samples were about average. Undoubtedly there is room for improvement, and although there were no white, hard, unripe cubes in the tins I saw, I consider that the colour was a little too pale to please the average dealer."

(*e*) "We should be very pleased and I think that most other importers of pines would also be very pleased, if their deliveries came in accordance with the samples which I saw opened. I should class both the Golden Cubes and the Slices and the G.A.Q. Cubes and Slices as wonderful deliveries of the grades, in fact, we have had deliveries of Golden fruit, only very slightly superior to the G.A.Q. which you opened. I do not remember ever having seen a tin of either Cubes or Slices, G.A.Q., as regularly packed, and as evenly yellow, and as regular in cutting as the tins that were opened. You could assure any shipper on the other side that, if they could make deliveries of grades, such as the samples which you opened, they would never have the slightest complaint on this side. "In regard to your enquiry as to whether we think an improvement in the grading would cause a better price to be obtained from the Pines, I think that it would, but I think that there should be a marked difference in the grading of the three grades, and I would suggest that in order to endeavour to capture a percentage of the trade done in the South African and Australian round-cut slices, more attention is given to the packing of Golden round-cut slices, and that it might even be advantageous not to pack any spiral cut slices in the Golden grade."

(*f*) "However, I think that, even in accordance with the grading rules, the sample of the G.A.Q. Pines is higher than that called for by the rules, and I should very much doubt if canners generally could keep up to this standard, unless they had other markets for disposal of the slightly lower grade, of which I should imagine they would have an accumulation.

On the subject of syrup two views were expressed —

(*a*) "The specification that you have submitted to us is quite all right with the exception that we believe the sugar content is different from that which is now being used by the packers. The present sugar content is quite all right for the trade because ripe pineapples are naturally a sweet fruit and there is no necessity for a heavy syrup."

(*b*) "In regard to the suggested grading ,it appears to be reasonable, but I think that the syrup should be heavier in the Golden Grade than in the G.A.Q., and still heavier than in the Seconds. At the present moment, the percentage of sugar by weight, appears to be about 10 per cent. I think at least 17 per cent. should be the percentage for Golden, higher would be advantageous, about 10 per cent. for the G.A.Q., and rather under this for the Seconds."

The opinions expressed in these letters also show, as stated in the Agent's letter, that —

> "There is a general concensus of opinion that what is required in the first instance is the complete elimination from the shipments to the United Kingdom of the 2nd. Grade product, and that strenuous efforts should be made to effect this as soon as possible.
>
> "On the general question of grading there is less unanimity, but there is a widespread view that the G.A.Q. must be kept to a higher average standard than that of current shipments."

Appendix.

GRADED.

G.A.Q. Cubes.

(1)	25 Pieces.	Clean cut poor colour as a whole pass as 2nd.		9¼ oz.
(2)	29 Pieces.	17 good, 12 poor.	Fair	9½ ,,
(3)	26 ,,	riper pine	Good	10 ,,
(4)	26 ,,	8 poor colour	Generally good	10 ,,
(5)	22 ,,	8 poor colour	Fair to good	9½ ,,

Golden Cubes.

(1)	26 Pieces	)	Up to standard of	10½ ,,
(2)	23 ,,	)	average Golden but	10 ,,
(3)	23 ,,	)	not superior	10 ,,

G.A.Q. Slices.

(1)	10 Slices.	Eyes not properly cut away 5 poor, 5 average	12½ ,,
(2)	10 ,,	1 piece definitely overripe imparting sour smell to tin: 2 pieces poor colour 7 quite good	13½ ,,
(3)	10 ,,	1 poor, otherwise good	12½ ,,

Taking all together is an improvement on present G.A.Q.

Golden Slices.

(1)	10 Slices.	Similar to (3) G.A.Q. deep cut		12½ ,,
(2)	10 ,,	4 poor	Fair Golden	13½ ,,
(3)	10 ,,	2 poor	Fair Golden	13 ,,

2nd. SAMPLES.

G.A.Q. Cubes.

(1)	22 Pieces.	Not uniform in size; 7 poor, 1 broken	9	oz.
(2)	27 ,,	Too light in colour; unripe; 12 worse than rest	10	,,
(3)	22 ,,	4 poor, better than (1) and (2)	9½	,,
(4)	24 ,,	A really good tin: 2 too light in colour	10	,,

Cubes uniform in size—colour fair; can be classified as good.

Golden Cubes.

(1)	22 Pieces.	Fairly uniform, 1 broken, 2 light colour Generally too light.	10	,,
(2)	23 ,,	Colour similar to (1) 7 poor—white spots and seeds	10	,,
(3)	21 ,,	3 broken, 3 spots, similar colour	9¾	,,
(4)	23 ,,	1 very spotty, 5 light colour	10	,,

As a whole under-coloured. Fruit firm and uniform.

G.A.Q. Slices.

(1)	10 Slices	1 brown — overripe: 5 light, 5 medium light in colour	13	,,
(2)	10 ,,	All patchy, colour lacking	11¾	,,
(3)	10 ,,	Colour better 2 light white spots and seed marks	12½	,,
(4)	10 ,,	Colour more uniform; many blemishes	13½	,,

Fair sample of G.A.Q.

F. W. S.

Reviews.

Modern Coffee Planting.

By E. G. Windle. 220 pp. London: John Bale, Sons, & Danielsson Ltd., 83-91, Great Titchfield Street, W. 1. 1933. Price 11 *shillings.*

This book is essentially a practical guide to coffee planting, and being written in a popular style, will appeal more to the planter than to the scientist.

Although the book deals exclusively with the cultivation of Arabica coffee in the hills of Southern India, more particularly around the districts of Mysore, it contains much valuable information which may be successfully applied to the cultivation of other varieties of coffee on the plains, or Arabica coffee on the hills in Malaya.

After brief mention of the origin of coffee and the importance of the Arabica variety as the most valuable for hill cultivation, the author describes, in considerable detail, the various operations connected with the opening up of a coffee estate. Chapters III to VI deal with the laying down of nurseries, felling and clearing, method of planting the crop in the field, digging of pits to prevent soil wash, and finally, the establishment and control of shade trees.

The upkeep of the estate is dealt with in Chapters VII to XI, which treat at some length, such operations as weeding, topping, manuring, pruning and digging, while Chapter XII is devoted to methods of harvesting the crop and the preparation of the beans for market.

The question of control of diseases and pests is fully discussed in Chapters XIV to XVIII and the effect of spraying the bushes with either Bordeaux or Burgundy mixtures for the control of leaf disease is strongly emphasized.

Finally, in Chapter XX attention is drawn to good quality in coffee. It is stated that, although soil and climate have a considerable influence on quality, for a good outturn (*a*) good season, (*b*) coffee picked when fully ripe, and (*c*) good cultivation are required. It has been found in India that beans having the highest specific gravity invariably realised the highest prices. Further, the colour of the bean influences its market value and, on the home markets, East India is expected to be "coloury" coffee of a good, dark green colour. Apparently, different colour standards apply to various types of beans produced in other countries.

Since the author has had a long and wide experience as a practical planter of coffee and other crops under conditions obtaining in Southern India, the information contained in this publication should not be lightly valued.

The book undoubtedly contains a vast amount of information on the subject and should prove most useful to those planters wishing to improve their knowledge of coffee cultivation as practised in South India.

B. B.

The Culture and Marketing of Tea.

By C. R. Harler, 384 pages and index; 8 illustrations and 2 maps. Humphrey Milford. Oxford University Press, London, 1933. Price 12 shillings and 6 pence.

The author of this book, having completed fourteen years as a scientific worker at the Experimental Station at Tocklai, Assam, records the experience gained while connected with the tea industry in North-East India. Although chiefly concerned with tea-growing in that part of Asia, Dr. Harler has visited other important tea-producing countries and includes a descriptive account of the industry in Ceylon, Java and Japan. The book serves as a valuable introduction to the subject both from the scientific and practical aspect and is recommended to those interested in tea cultivation in Malaya.

The subject is dealt with in four parts. The first part describes the tea plant and its habitat and gives a general account of cultivation and manufacture. The botanical nomenclature of the tea plant agreed to is *Thea sinensis* (L) Sims. This name was used by Linnaeus in 1753 for the Chinese bush and employed by Sims in 1807 to include all varieties then known under one species. Adopting the classification of Cohen Stuart, varieties are confined to four groups based on leaf characters, height of the tree and original habitat.

The importance of vegetative propagation is stressed in connexion with selection. Crown grafting, budding, and upright stem layering have been employed with success in Java. Recent investigations in that country and Malaya, however, show that etiolation is a ready method of vegetative propagation.

Climatic and soil conditions are dealt with in separate chapters. Whilst the range of soil reaction tolerated by tea is a wide one, entending from pH 4 to neutrality, successful tea soils in North-East India usually show p H values between 5.4 and 6, *i.e.* are on the acid side.

Part II deals with the chemistry and pharmacology of tea which is of particular interest in connexion with manufacture.

The third part describes the methods practised in the most important tea-producing countries with special reference to North-East India. Two chapters are devoted to China and Japan, including Formosa. The Chinese methods are traditional and have been changed little by science, but both in Japan and Formosa modern machine processes are in use. A chapter on tea-tasting and terms used in describing teas is useful for reference when dealing with tea samples. The tea industries in Ceylon and in Java are described briefly in separate chapters.

The last part consists of two chapters summarizing production and consumption, and describes the tea markets of the world. Reference is made to the restriction scheme in force whereby the export of tea from producing countries is regulated and further planting held in abeyance. The scheme is to remain in operation in some form for five years and has already resulted in a very beneficial effect on tea prices.

J. N. M.

Departmental.

FROM THE DISTRICTS.

July 1934.

Compiled by the Chief Field Officer from Monthly Reports submitted by Field Officers.

The Weather.

During the early part of the month, weather conditions were universally dry. Towards the middle and end of the period heavy rains were experienced in Kedah bringing the monthly precipitation substantially above the average. Late rains in the coastal areas of western Johore caused a slight increase over the average, while in all other States, and the inland districts of Johore, the monthly rainfall was considerably below normal, with the exception of Malacca and the northern areas of Province Wellesley.

Remarks on Crops.

Rubber.—A substantial rise in price is reported from all centres, an increase of up to $6.00 per picul being recorded from Pahang South.

The regulation of production and incidence of padi planting have materially decreased the output. Moderation of tapping systems and improvement in sanitation is general. In the northern areas of Johore, however, tapping continues to be heavy in the Districts of Muar and Batu Pahat, though reports indicate that the tapping rate tends to decline and is only moderate at Segamat.

Unfavourable weather conditions tended to check the distribution and spread of mouldy rot disease. The voluntary control of this disease continues to be satisfactory, and extended sales of approved fungicides have been reported, more particularly from Negri Sembilan, where 336 gallons were disposed of to small rubber-holders. This disease, introduced undoubtedly from the mainland, was reported from Langkawai for the first time.

Padi.—In Province Wellesley south, central Perak, the coastal areas of Malacca and parts of Pahang, dry weather conditions delayed cultivation and nursery establishment. As a result of this setback some 200 acres at Padang Kampar in Pahang will not be cultivated during the current season. In most other centres, however, the planting programme is well advanced.

Large quantities of bones have been imported into Malacca from Kedah, Perak and Selangor for use as a fertiliser, at prices ranging from $2.50 to $4.50 per picul, depending upon size. A depot for the sale of Perlis phosphate has been opened by the firm working the Bukit Ketu deposits.

An aggregate of several thousand acres of dry padi interplanted among coconuts between Muar and Batu Pahat in Johore is now in ear, and a good crop is anticipated.

Coconuts.—Further progress in improved methods of copra production is reported from Province Wellesley, Pahang East and Johore, where extensions in the number of good types of kilns suitable for small holdings have been noted. A further consignment of copra from the State-aided kiln at Sri Menanti, Johore, averaged $2.92 per picul, while $3.15 was realised by a small holding manufacturer in Province Wellesley.

As a result of low prices ruling for copra, the possibilities of a profitable inland export of nuts from the coastal areas of Muar in Johore are now being investigated.

Tobacco.—New plantings aggregating 60 acres were reported from Kedah, while extensions to existing areas have been undertaken in Johore, and in the Raub District of Pahang, which maintains an appreciable export to Kuala Lumpur.

Tea.—In Malacca, Chinese small-holders are evincing much interest in this crop, and extensions to the planted areas have been undertaken at Machap and Sungei Petai.

Fruit.—The mid-season fruit crop was, on the whole, very poor. In Kedah, durians and mangosteens were in fair supply. In Negri Sembilan, these fruits, although not plentiful throughout the State, supported a considerable export trade to Singapore, more particularly from the sub-district of Rembau. In Perak the durian and mangosteen crops from Selama were poor, but moderate supplies of the former fruit were available at Bukit Gantang and Batu Kurau in Larut, at Kuala Kangsar, and also in the vicinity of Tapah and Tanjong Malim. Prices realised were fairly high and ranged from $7 to $9 per 100 at the beginning of the month. Selected durians from Batu Kurau realised from cents 15 to 25 each. The season in Malacca was extremely poor, mangosteens being a complete failure.

Agricultural Stations.

The total yield of green leaf harvested during the month at the Tanah Rata Experiment Station was 10,302 pounds, from which 1,992 pounds of made tea were manufactured. A break of 72 half chests was despatched to London during the month. Further progress was made in extending the areas under tea and coffee at this Station, while a site was selected and laid out to test the possibility of establishing lucerne by the application of fertilisers and the provision of shade.

At the Singapore Pineapple Station, fruiting continued throughout the month, returns falling off appreciably towards the end of the period. Experimental work on fertilising was continued. A crop of 428 pounds of green leaf of Deli and Jaffna varieties of tobacco was harvested and cured.

Satisfactory progress has been maintained at the stations under development at Kilanas in Brunei and Bukit Kallam in Labuan.

Padi Stations and Test Plots.

Favourable weather conditions enabled good progress to be made with cultural operations at the Telok Chengai Station in Kedah. Nurseries were manured and sown with local and improved selections. The distribution of selected seed to different districts was completed during the month.

In Krian cultural operations were well advanced and nurseries sown at Titi Serong Station; work on padi test plots has made good progress including the development of a new plot in the mukim of Bagan Serai. Dry conditions throughout the District caused some anxiety during the early part of the month; broken weather during the last week, however, materially eased the situation.

In other centres work is well in hand, and where established, crops look promising.

Felling operations were completed on 24 acres of the reserve for a padi station at Sungei Manik, and further progress has been made in connexion with the opening up of test plots at Tanjong Karang, Panchang Bedina and Sungei Haji Dinani in the Kuala Selangor District of Selangor.

Poultry.

Outbreaks of disease were reported from Sungei Bakau and Kuala Kurau in Krian District and from Selama town. Each case was investigated by a veterinary officer who attributed the outbreaks at Sungei Bakau and Selama to Diptheritic Stomato-pharyngitis.

An outbreak of fowl pox at Renglet was confirmed by a Veterinary Inspector from Kampar who gave advice regarding treatment.

The outbreak reported from Penggerang in Johore last month is now abating. Heavy losses have been sustained.

Rural Lecture Caravan.

The Rural Lecture Caravan was on tour in Perak during the month and visited nine centres in the Kuala Kangsar, Kinta and Lower Perak Districts. Instruction was mainly confined to mouldy rot disease control and poultry husbandry, except at Sitiawan, where lectures on improved methods of copra production were included. A satisfactory amount of interest was shown in the slides and exhibits demonstrating the subjects upon which concentration was focussed. The films as usual attracted large audiences.

Small-Holders Rubber Advisory Service.

In accordance with the recommendations of the Rubber Research Institute Commission of Enquiry that a service of Asiatic Instructors should be organised for instructional work in small rubber holdings, an approved scheme was inaugurated during the month, and nine officers, including eight Malays and one Indian, were posted for duty in Kedah, Negri Sembilan, Perak, Selangor, Johore and Pahang.

Instructors are recruited by and paid from Rubber Research Institute funds, and at the completion of their training are attached to the staffs of the State and divisional agricultural officers, who issue the necessary instructions and supervise and plan their work, in accordance with general lines drawn up by the Director of Agriculture, and the Director, Rubber Research Institute.

In most centres these officers have already accomplished useful work in obtaining information relating to small holdings, delivering lectures on improved methods of manufacture, and organising demonstrations on matters requiring improvement.

Note :—Local prices of various commodities are now published under Market Prices.

DEPARTMENTAL NOTES.

Death of Inche' Embi bin Hassan.

The death of Inche Embi bin Hassan, Notice Server, Taiping, which occurred in the early morning of 1st August, 1934, is recorded with deep regret.

Inche Embi joined the Department on 15th October, 1924, and has thus had just under ten years service, the whole of which has been spent in Taiping.

The staff in Taiping and other departmental officers who knew him wish to record their deep sympathy with his widowed mother in her bereavement.

Leave of Director of Agriculture.

Dr. H. A. Tempany, C.B.E., Director of Agriculture, S.S. and F.M.S., has been granted 7 months and 22 days full pay leave from 11th July 1934 to 4th March 1935 inclusive.

Mr. F. W. South, Chief Field Officer, has been appointed Acting Director of Agriculture during Dr. Tempany's absence on leave.

Pineapple Industry Legislation.

The Director of Agriculture and the Chief Field Officer attended a meeting at Singapore on 6th July, of the Committee appointed to recommend to Government regulations for the registration of factories and making of cans under the Pineapple Industry Ordinances and Enactments.

The question of a grading scheme was also discussed with Government officials and representatives of the industry.

Visits of the Director of Agriculture.

The Acting Director of Agriculture inspected various agricultural stations in Selangor on 25th and 26th July. He also paid official visits to Negri Sembilan and Malacca on 30th and 31st July, for the purpose of inspecting Agricultural Stations and Padi Test Plots.

Agricultural Advisory Committee.

A meeting of the Agricultural Advisory Committee was held at the Department of Agriculture, Kuala Lumpur, on 14th June 1934. A number of important subjects were discussed and the position regarding several lines of work passed under review. Amongst the more important subjects which engaged the attention of the Committee were the following:—Provision of funds for research work on pineapple canning; grading of pineapples and pineapple legislation; suggestions for the relief of the coconut industry; development of the rice industry; improvement of poultry in small holdings.

Leave.

Mr. H. J. Simpson, Agricultural Field Officer, returned from leave on 6th July 1934, and has assumed duty as acting State Agricultural Officer, Pahang.

Staff Change.

Mr. A. E. Coleman-Doscas, State Agricultural Officer, Negri Sembilan has been appointed to act as Chief Field Officer from 11th July 1934.

Statistical.

MARKET PRICES.

July, 1934.

Rubber.—The price of rubber continued its upward trend during July, improving from 22⅜ cents per lb. for spot loose in Singapore to 23½ cents per lb. at the close. The average price for the month in Singapore of Smoked Sheet, equal to London Standard was 23.53 cents per lb. as compared with 21.82 cents per lb. in June. In London the average price in July was 7.03 pence per lb. and in New York 14.51 cents gold per lb. as compared with 6.46 pence and 13.36 cents gold respectively in June.

Weekly prices paid during July for small-holders' rubber at three centres are shown in Table II.

Palm Oil.—The market rallied slightly during July and its course is shewn in the following table of the Malayan commodity: basis 5 per cent. f.f.a.

Table I.

DATE 1934.	PALM OIL			KERNELS
	L'Pool/Holland/ Hamburg c. i. f. landed weights in bulk per ton £. s. d.	L'Pool/Continent c. i. f. per ton net in barrels £. s. d.	Halifax (Nova Scotia) c.i.f. landed weights per lb. Cents gold.	Fair Average Malayan Quality c. i. f. Landed Weight per ton on Continent. £. s. d.
July 4	9 5 0	11 15 0	—	5 17 6
„ 11	9 5 0	11 15 0	—	6 2 6
„ 18	9 7 6	11 10 0	—	6 2 6
„ 25	9 15 0	11 15 0	2.20	6 2 6

Copra.—There was practically no change in the copra market in Singapore during July, the price for the sun-dried grade opening and closing at $2.95 per picul after touching $3.05. Shipments from the East as a whole for the first four months of the year show an increase of some 30,000 tons compared with 1933, so that the prospect of a sustained price advance seems remote. The average price for the month was $2.95 as compared with $2.93 in June. The mixed quality averaged $2.49 per picul as compared with $2.51 in the previous month.

Copra cake improved slightly to $1.10 per picul and rose further at the end of the month to $1.20.

Rice.—The average wholesale prices of rice per picul during June were as follows:—Siam No. 2 (ordinary) $2.66, Rangoon No. 1 $2.50, Saigon No. 1 (long grain) $2.60 as compared with $2.60, $2.42 and $2.50 respectively in May. Corresponding prices in June 1933, were $3.83 and $3.04 for Siam No. 2 and Rangoon No. 1 respectively.

The average retail market prices in cents per gantang of No. 2 Siam rice in June were:—Singapore 21, Penang 25, Malacca 23, as compared with 23, 25 and 23 respectivly in May.

The average declared trade value of imports of rice in June was $2.93 per picul as compared with $3 in April and $3.10 in May of this year.

Padi.—The price paid for padi at the Government Rice Mill, Bagan Serai, remained at $1.25 per picul while a private mill continued to pay $1.30 per picul.

In Kedah the price rose steadily and reached the equivalent of $1.25 to $1.40 per picul by the end of the month. In Province Wellesley the price range was $1.37 to $1.50 per picul and elsewhere there was little change, the price varying from 5½ to 12 cents per gantang.

Tea.—The London price quoted for Malayan tea during June was 1s. 0¾d. For the same month, average London prices per lb. for tea consignments from other countries were as follows:—Ceylon 1s. 1.49d., Java 11.17d., Indian Northern 1s. 1.03d., Indian Southern 1s. 1.20d., Sumatra 10.89d. Prices of all grades declined during the month.

Tuba Root (Derris).—A much firmer tone prevails for roots sold on the basis of ether extract, the average Singapore price for July being $34.50 per picul, an advance of $4. Roots sold on rotenone content remained steady at the previous month's average of $40 per picul.

Coffee.—The Singapore price of coffee improved slightly during July. Sourabaya coffee rose from a range of $19 to $21 per picul according to grade to $19.75 to $21.50, closing, however, at $19 to $21. Palembang coffee remained steady at $13 per picul with a short rise during the month to $13.50. The average for the month was $13.12 as compared with $12.85 in June.

Local prices for coffee beans have ranged from $12 to $38 per picul in various parts of the country.

Arecanuts.—Average prices per picul in Singapore during July were as follow:—Splits $2.79 to $4.19; Bila Whole $2.44; Sliced $11.62 to $13.62; Red Whole $4.12 to $5.62; Sourabaya Whole $5.12 to $6.50; Kelantan Whole $3.25 to $3.59, the price within each range depending upon quality.

The average prices per picul quoted by the Singapore Chamber of Commerce were:—Best $4.06, Medium $3.75, Mixed $3.10.

Gambier.—Singapore prices varied little during July, Block remaining steady at $4 per picul as against an average of $4.05 in June and No. 1 Cube improving slightly to close at $7.50 per picul, with an average of $7.38 as compared with $7.30 in June.

Pineapples.—Prices advanced appreciably during the month on rather better demand in London and on reports of a falling off in the fruit crop, but at the end of the month, business was virtually at a standstill as buyers would not pay the higher prices. Average prices per case for July were as follows:—Cubes $3.19, Sliced Flat $3.15, Sliced Tall $3.35 as compared with $3.01, $3 and $3.12 respectively in June.

Prices for fresh fruits in Johore were:—First quality $2.40—$2.60, second quality $1.60—$1.70, third quality 90 cents to $1.50 per hundred. Prices in Singapore were $2.50 and $1.50 per hundred for first and second quality fruits. In Selangor prices ranged from 60 cents to $2 per hundred for large fruit.

Tapioca.—Prices in Singapore were lower during July but remained steady with the exception of a slight decline in Flake Fair at the end of the month. Average prices per picul were: Flake Fair $3.94, Pearl Seed $5.75, Pearl Medium $6 as compared with June averages of $4.33, $5.86 and $6.20 respectively.

Sago.—As usual the tapioca market was reflected in this commodity. Average prices per picul in Singapore were Pearl, Small Fair, $3.84 and Flour, Sarawak Fair $1.85 as against $3.84 and $1.85 in June.

Mace.—There was no change in the Singapore market for mace during the month. Prices remained steady at $70 per picul for Siouw and $50 per picul for Amboina as in June.

Nutmegs.—Prices in Singapore improved slightly during July, averaging $23.25 per picul for 110's and $24.25 per picul for 80's as compared with $22.50 and $23.50 respectively for June.

Pepper.—Prices eased off still further during July, the weight of stocks in England and America tending to depress the market, but firmed appreciably (especially White) at the close of the month on renewed enquiry from Europe. Average prices per picul in Singapore were:—Singapore Black $13.31, Singapore White $31.63, Muntok White $32.12 as compared with June average prices of $14.85, $33.60 and $3.40 respectively.

Cloves.—Singapore prices continued nominal at Zanzibar $35 and Amboina $45 per picul.

Tobacco.—Prices of sun-dried leaves have ranged from $7 to $50 per picul according to quality, in most parts of the country. The range in Kelantan was from $40 to $60, and in Johore from $30 to $75.

Table II.

Weekly Prices Paid By Local Dealers for Small-Holders' Rubber, July, 1934.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.				Kuala Kangsar, Perak.		Batu Pahat Johore.			
	5	12	19	26	4	11	4	11	18	25
Smoked sheet		28.96	27.00	28.00						
Unsmoked sheet	25.06	26.00	26.71	26.51			23.00	24.00	25.00	25.00
Rubber*					24.00	25.55				
Scrap	15.00									

*Wet unsmoked sheet.

Transport by lorry Kuala Pilah to Seremban 15 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang $1.24 per picul, Seremban to Singapore $8.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway $6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway $10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent.

No purchases at Kuala Kangsar on the 18th and 25th July.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Mackay & Co., Singapore.

1 picul = 133⅓ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.

GENERAL RICE SUMMARY.*

June 1934.

Malaya.—The imports into Malaya of foreign rice during June were 46,687 tons and exports 11,550 tons, net imports accordingly being 35,137 tons. The net imports for the period January to June 1934, were 221,292 tons, an increase of 10.3 per cent. over the corresponding six months of 1933.

Of the imports during June, 45 per cent. were consigned to Singapore, 15 per cent. to Penang, 6 per cent. to Malacca, 24 per cent. to the Federated Malay States and 10 per cent. to the Unfederated Malay States. Of the total, 69 per cent. came from Siam, 29 per cent. from Burma, 1 per cent. from French Indo-China and 1 per cent. from other countries. Of the exports during June, 69 per cent. were shipped to Netherlands India and 31 per cent. to other countries.

The various kinds of rice exported were:—Siam 6,891 tons (59.7 per cent.), Burma 4,064 tons (35.2 per cent.), Indo-China 381 tons (3.3 per cent.), India 42 tons (.3 per cent.), local production 172 tons (1.5 per cent.).

India and Burma.—Foreign exports for the period January to April, 1934, were 586,000, a decrease of 19.1 per cent. as compared with the exports for the same period of 1933, which were 724,000 tons.

The total exports of rice and bran from Burma for the period 1st January to 31st May, 1934, were 2,000,439 metric tons, as compared with 1,716,470 metric tons for the corresponding period of 1933, an increase of 16.5 per cent.

Siam.—The exports of rice from Bangkok in May were 169,367 tons; total exports for the first five months of 1934, were 748,195 tons as compared with 707,675 tons during the corresponding period in 1933.

Japan.—Formosa. According to the first estimate of the first rice crop of 1934, the area planted amounted to 712,750 acres, an increase of 5,160 acres or .7 per cent. as compared with the corresponding crop of 1933. Production is estimated at 603,600 tons, an increase of 51,200 tons, or 9 per cent., as compared with the actual results recorded for the same crop of 1933.

French Indo-China.—A report on the Saigon Rice Market for June, 1934, states that during the first fortnight, prices of padi fell as a result of the general fall in the price of rice. Arrivals from the interior were normal. During the second half of the month, prices rose with the rise in price of rice. It is probable that the renewed activity in the rice market will obviate a dangerous increase in stocks at Cholon.

Rice prices fell steadily and nearly reached the lowest level of the year owing to the threatened imposition of a quota on Indochinese rice importations into France in addition to an import tax of 10 francs per quintal. Better news from France and a number of orders from India caused a recovery in the second half of the month. Brokens:—Prices fell away markedly early in the month but recovered slightly and closed on a fairly firm note, owing to low stocks.

* Abridged from the Rice Summary for June, 1934, compiled by the Department of Statistics, S.S. and F.M.S.

Netherlands India.—According to the *Economic Bulletin* dated 1st June, 1934, the area of harvested padi (wet and dry) in Netherlands India during the first quarter of 1934, amounted to 1,450,631 acres as compared with 1,174,979 acres in the corresponding period of 1933, an increase of 23.5 per cent.

Imports of rice into Netherlands India (*Economic Bulletin* dated 16th June, 1934) during the first quarter of 1934, amounted to 39,353 metric tons as compared with 129,827 metric tons during the first quarter of 1933, a decrease of 69.7 per cent.

Ceylon.—The imports for the first half year of 1934, were 243,009 tons, showing an increase of 10.1 per cent. as compared with the imports of 220,768 tons for the corresponding period of 1933. Of the 1934 imports, 14 per cent. were from British India, 65 per cent. from Burma and 21 per cent. from other countries.

Europe and America.—Shipments from the East to Europe were 701,574 tons for the period 1st January to 28th June, 1934, as compared with 762,397 tons for the corresponding period of 1933, a decrease of 8 per cent.

Of the 1934 shipments, 45 per cent. were from Burma, 3 per cent. from Japan, 40 per cent. from Saigon, 9 per cent. from Siam and 3 per cent. from Bengal. The corresponding percentages for 1933, were 54, 3, 36, 6 and 1 per cent. respectively.

Shipments to the Levant from the East during the period 1st January to 7th June, were 19,055 tons as compared with 16,941 tons for the same period in 1933, an increase of 12.5 per cent.

Shipments to the West Indies and America from the East were 91,079 tons for the period 1st January to 10th June as compared with 65,352 tons during the corresponding period in 1933, an increase of 39.4 per cent.

MALAYAN AGRICULTURAL EXPORTS, JUNE, 1934.

PRODUCT.	Net Export in Tons.				
	Year 1933.	Jan.-June 1933.	Jan.-June 1934.	June 1933.	June 1934.
Arecanuts ...	20,756	10,613	17,250	1,428	1,999
Coconuts, fresh ...	100,609†	48,794†	45,695	11,129†	7,960†
Coconut oil ...	17,568	9,443	12,583	1,536	1,833
Copra ...	110,543	39,095	44,827	3,344	6,475
Gambier, all kinds ...	2,560	1,217	1,042	177	132
Oil cakes ...	9,992	6,013	6,191	1,231	1,220
Palm kernels ...	1,983	792	1,345	180	203
Palm oil ...	12,101	4,093	6,229	340	1,279
Pineapples canned ...	59,582	32,674	39,557	8,097	10,043
Rubber ...	459,836§	208,747§	235,446§	39,552§	24,203§
Sago,—flour ...	7,648	1,934	4,246	98	115
„ —pearl ...	2,646	1,049	2,123	163	348
„ —raw ...	4,420*	2,037*	2,899*	393*	499*
Tapioca,—flake ...	9,881	6,008	4,114	896	529
„ —flour ...	702*	141*	1,238*	40	340*
„ —pearl ...	17,297	7,975	7,941	1,023	1,199
Tuba root ...	569½	231	297	49	38

† hundreds in number. * net imports. § production.

MALAYAN PRODUCTION IN TONS OF PALM OIL AND KERNELS 2nd QUARTER, 1934.

(As declared by Estates)

	Palm Oil		Palm Kernels	
	F. M. S.	Johore	F. M. S.	Johore
April	912.7	169.5	307.5	58.8
May	749 0	154.1	444.0	88.4
June	721.0	116.6	543.0	104.0
Total	2,382.7	440.2	1,294.5	251.2

MALAYA RUBBER STATISTICS

ACREAGES OF TAPPABLE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING JUNE, 1934.

STATE OR TERRITORY	Acreage of Tappable Rubber end 1933 (*d*)	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING		AREA OF TAPPABLE RUBBER NEVER BEEN TAPPED		Total (3) + (5)	Percentage of (9) to (2)
		Acreage	Percentage of (3) to (2)	Acreage	Percentage of (5) to (2)	Acreage	Percentage of (7) to (2)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
STRAITS SETTLEMENTS :—									
Province Wellesley	44,285	1,106	2.5	8,455	19.1	806	1.8	9,561	21.6
Dindings	7,368	112	1.5	974	13.2	109	1.5	1,086	14.7
Malacca	121,152	1,540	1.3	18,857	15.5	3,562	2.9	20,397	16.8
Penang Island	1,366	318	23.3	312	22.8	93	6.8	630	46.1
Singapore Island	28,842	4,831	16.7	4,158	14.4	744	2.6	8,989	31.1
Total S.S. ...	203,013	7,907	3.9	32,756	16.1	5,314	2.6	40,663	20.0
FEDERATED MALAY STATES :—									
Perak	253,227	4,206	1.7	37,761	14.9	12,325	4.9	41,967	16.6
Selangor	310,003	3,586	1.2	45,264	14.6	12,770	4.1	48,850	15.8
Negri Sembilan	233,592	8,623	3.7	35,773	15.3	19,429	8.3	44,396	19.0
Pahang	46,712	2,385	5.1	11,037	23.6	5,842	12.5	13,422	28.7
Total F.M.S. ...	843,534	18,800	2.2	129,835	15.4	50,366	6.0	148,635	17.6
UNFEDERATED MALAY STATES :—									
Johore	(*c*) 325,747	14,906	4.6	25,340	7.8	21,253	6.5	40,246	12.4
Kedah (*a*) (*b*)	126,588	12,123	9.6	15,631	12.3	18,048	14.3	27,754	21.9
Kelantan	25,793	5,451	21.1	2,735	10.6	4,147	16.1	8,186	31.7
Trengganu (*b*)	4,543	Nil	Nil	171	3.8	171	3.8	171	3.8
Perlis (*a*) (*f*)	1,181	159	13.5	192	16.2	318	26.9	351	29.7
Total U.M.S. ...	483,852	32,639	6.7	44,069	9.1	43,937	9.1	76,708	15.8
TOTAL MALAYA ...	1,530,399	59,346	3.9	206,660	13.5	99,617	6.5	266,006	17.4

Notes :—(*a*) Rendered quarterly.
(*b*) Registered Companies only.
(*c*) Figures are for end December, 1932.
(*d*) Area out of tapping on Estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping round.
(*e*) Figures are as reported by estate managers.
(*f*) Figures are for end March, 1934.

FOR THE MONTH OF JUNE, 1934 IN DRY TONS.

State or Territory	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month		
								during the month		January to May inclusive 1934		during the month		January to May inclusive 1934				
	Ports	Dealer	Estates of 100 acres and over	during the month	January to June inclusive 1934	during the month	January to June inclusive 1934	Foreign	From Malay States & Labuan	Foreign	From Malay States & Labuan	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
MALAY STATES :—																		
Federated Malay States ...	...	976	3,807	11,282	68,288	1,726	56,703	Nil	Nil	Nil	Nil	†12,135 *(3,880)	... *(931)	95,265	50,344	...	5,133	7,840
Johore ...	...	222	976	3,690	22,064	988	26,814	Nil	68	Nil	148	1,167	1,248	10,078	41,906	...	1,113	2,416
Kedah ...	...	6	436	2,653	16,372	194	9,279	Nil	Nil	Nil	Nil	1,224	102	8,706	17,814	...	289	1,674
Perlis ...	...	Nil	4	8	80	43	215	Nil	Nil	Nil	Nil	Nil	12	Nil	295	...	30	13
Kelantan ...	...	Nil	61	232	1,352	168	4,479	Nil	Nil	319	Nil	67	126	554	5,746	...	130	138
Trengganu ...	...	55	50	71	1,304	36	650	Nil	Nil	Nil	Nil	Nil	107	Nil	1,954		55	50
Total Malay States	...	1,259	5,334	17,936	109,469	3,155	98,140	Nil	68	319	148	14,593	2,526	114,603	118,059	...	6,750	12,131
STRAITS SETTLEMENTS :-																		
Malacca ...	...	551	369	1,381	7,912	445		1		4		2,721		21,394		...	1,051	672
Province Wellesley	...	12	144	884	3,462	32		Nil		Nil						...	136	448
Dindings ...	...	1	22	109	637	26	14,694	Nil	3,214	Nil	107,490	7,741	Nil	50,350	Nil	...	42	77
Penang ...	4,719	14,281	3	13	71	15		2,591		13,320						2,990	14,880	7
Singapore ...	11,858	58,336	82	189	1,070	18		18,389		105,048		28,280		164,472		7,554	55,149	158
Total Straits Settlements	16,577	73,181	620	2,576	13,152	536	14,694	20,981	3,214	118,372	107,490	38,742	Nil	236,216	Nil	10,544	71,258	1,362
TOTAL MALAYA	16,577	74,440	5,954	20,512	122,612	3,691	112,834	20,981	3,282	118,691	107,638	53,335	2,526	350,819	118,059	10,544	78,008	13,493

N.B.—In view of the abnormal situation during the months of May and June, and the combination in this return of exports from local areas with ocean-shipments from Malayan ports, the above figures should be read strictly in accordance with the footnotes.

† Ocean-shipments from Malaya of rubber direcly consigned from the F.M.S.

* Export of rubber from the F.M S. during June, 1934.

TABLE II

DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province We'sly D'dings M'cca.	Johore	Kedah
20	21	22	23	24	25	26
DRY RUBBER	4,176	44,176	11,211	1,210	797	160
WET RUBBER	957	10,973	3,669	19	316	129
TOTAL ...	5,133	55,149	14,880	1,229	1,113	289

TABLE III

FOREIGN EXPORTS

PORTS	For month	January to June 1934
Singapore ...	39,634	233,692
Penang ...	11,390	77,566
Port Swettenham.	2,177	35,756
Malacca ...	134	3,805
MALAYA ...	53,335	350,819

TABLE IV

DOMESTIC EXPORTS 4

AREA	For month	January to June 1934
Malay States ...	17,014	223,904
Straits Settlements	1,155	
MALAYA ...	18,169	223,904

Notes:—

1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.
2. The production of estates of less than 100 acres is estimated from the formula : Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month, + Consumption, *i. e.*, Column [9] = Columns [15] + [16] + [19] + [20] + [21] + [22] − [4] − [5] − [6] − [7] − [11] − [12]. For the Straits Settlements, Columns [9] figures for Singapore and Penang Islands represent sales or exports as shown by cess paid and for the mainland represent as purchases by dealers from local estates of less than 100 acres, reduced by 15 % to terms of dry rubber.
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.
4. Domestic exports represent for Malay States, Province Wellesley, Malacca and Dindings net exports from these territories, and for Singapore and Penang Island sales or exports of rubber as shown by cess paid.
5. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S. and F.M.S., at Singapore on 28 July, 1934.

METEOROLOGICAL SUMMARY, MALAYA, JUNE, 1934.

Locality.	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine.		
	Means of			Absolute Extremes									Number of days.							
	A. Max.	B. Min.	Mean of A and B.	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot	At 4 feet	Total.		Most in a day. Amt.	Precipitation .01 in or more	Precipitation, .04 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more	Total.	Daily Mean.	Per cent.
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.								
Railway Hill, Kuala Lumpur, Selangor ...	90.2	72.4	81.3	94	70	87	75	84.1	84.9	7.13	181.1	2.72	20	17	5	2		158.70	5.29	43
Bukit Jeram, Selangor ...	87.5	72.8	80.1	90	69	85	75	83.7	85.8	6.22	158.0	1.58	16	13	3	1	1	205.40	6.85	56
Sitiawan, Perak ...	89.6	73.3	81.5	92	71	87	75	84.4	85.2	3.01	76.5	0.64	16	12		1		209.50	6.98	57
Temerloh, Pahang ...	89.3	73.0	81.1	93	71	80	74	84.6	86.1	8.26	209.8	2.06	21	19		3		170.20	5.67	46
Kuala Lipis, Pahang ...	88.4	71.8	80.1	92	70	83	73	84.0	84.9	7.00	177.8	3.43	20	14	2	25		159.80	5.33	43
Kuala Pahang, Pahang ...	87.5	73.8	80.7	90	72	83	75	86.7	85.9	2.15	54.6	0.53	9	8	3			216.20	7.21	59
Mount Faber, Singapore ...	* —	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Butterworth, Province Wellesley ...	87.6	74.4	81.0	90	72	83	77	84.1	84.9	7.45	189.2	1.11	17	14	1			204.10	6.80	55
Bukit China, Malacca ...	84.4	73.7	79.1	87	71	82	75	83.1	84.3	8.85	224.8	3.00	21	17	3			170.15	5.67	46
Kluang, Johore ...	86.8	70.9	78.9	93	69	76	74	81.4	82.3	11.54	293.1	2.17	26	21	1	8		132.10	4.40	36
Bukit Lalang, Mersing, Johore	86.8	71.9	79.3	90	70	80	73	82.3	82.3	4.31	109.5	0.76	17	13	3	1		193.40	6.45	52
Alor Star, Kedah ...	88.2	74.6	81.4	91	72	82	77	87.0	86.4	5.67	144.0	1.42	17	15	4	1		223.35	7.45	59
Kota Bahru, Kelantan ...	89.9	74.0	81.9	93	72	87	76	85.2	85.4	5.93	150.6	2.13	11	8	2			249.10	8.30	67
Kuala Trengganu, Trengganu	88.9	72.7	80.8	92	70	85	74	83.9	84.9	9.73	247.1	5.04	10	7	1			229.00	7.63	62
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft. Pahang ...	74.5	62.9	68.7	78	62	70	64	71.9	72.3	9.95	252.7	1.62	22	18	5	2		146.50	4.88	40
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	73.2	57.0	65.1	78	51	70	62	70.2	69.7	8.35	212.1	1.02	21	18				134.25	4.47	36
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft. ...	72.1	59.9	66.0	75	59	69	61			9.27	235.5	1.05	22	17				141.40	4.71	38